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Vol. VI.—No. 3. FEBRUARY, 1898.

THE
Geelong Naturalist.

JOURNAL OF THE

Geelong Field Naturalists' Club.

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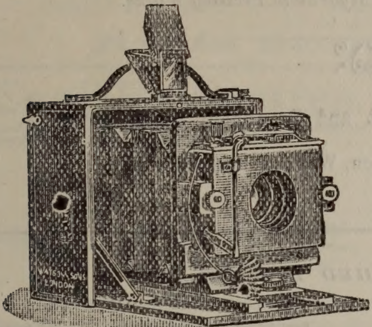

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Vol. VI. FEBRUARY, 1898. No. 3.

The Editor is not responsible for the statements made in any paper.

All Articles should be written on one side of the paper only, and all scientific names should be CORRECT *and* LEGIBLE.

All communications in reference to "The Geelong Naturalist" should be addressed to the Editor, Mr G. H. Adcock, F.L.S., Mechanics' Institute, Geelong, and all communications in reference to other matters should be addressed to the Hon. Sec., Mr A. B. F. Wilson, Mechanics' Institute, Geelong, Victoria, Australia.

We would respectfully request that all Publications, Specimens, &c., intended for the Club, should be addressed and forwarded to the Hon. Sec. direct, who will acknowledge the receipt of the same without delay.

Communications in regard to Meteorological matters should be addressed to the Registrar, Mr J. E. Bennett, Mechanics' Institute, Geelong.

NOTES.

The Hon. Librarian begs to acknowledge the following publications with thanks :—

"Abstract of Proceedings of the Linnean Society, New South Wales, for November 24th, 1897."

"The Victorian Naturalist" for February and March, 1898.

The Editor invites communications on any subject connected with Natural Science.

Members are notified that the Meetings of the Club are held in the Geelong Mechanics' Institute, Monthly, 7.45 p.m.

Members are to be congratulated upon the establishment of the first complete Meteorological Station in Geelong. In a letter received, the Goverment Astronomer (Mr. Barrachi) says :— "The recently established Meteorological Station of the Geelong Field Naturalists' Club, satisfies in respect of the quality of instruments, their location and management, all the conditions required by the official weather service of the colony, and that it has been duly registered an official station for Geelong." The station is under the able control and supervision of Mr. John E. Bennett, through whose untiring efforts this important branch of our work has been established.

Future issues of "The Geelong Naturalist" will contain the meteorological records.

In this issue we publish a List of Birds of the Geelong and Cape Otway District. Out of 393 of our Victorian Fauna, Class II, Aves—Birds, in these districts alone there are 225 to be obtained.

We are pleased to find that the Journal of the Club is being appreciated outside of Australia. Applications having recently been made through the issue of the Journal, from Canada, Scotland, France, America and other countries for exchange in Botanical, Zoological and Geological specimens.

Members are notified that the Annual Meeting of the Club will be held on the 28th June, 1898.

PARASITES AFFECTING DOMESTIC ANIMALS.

By H. S. Kyle.

Read before the Geelong Field Naturalists' Club.

The study of Parasites, termed Helminthology, makes one of the most interesting studies that a man can take up. For beginning, as it does, with life in its most rudimentary form, it enables one to trace the various forms of life from the lowest of the animal world to that complex being called man.

A Parasite may be defined as a living organism obtaining its nourishment at the expense of another living organism. Parasites include both animal and vegetable forms of life. Every animal appears to act as a host to its own peculiar parasite, if not as a host of one common to most animals. Even parasites may act as the host of other parasites; for example, take the Cattle Tick, which no doubt you have all had brought before your notice through the medium of our daily papers, and which, at the present time, is producing such ravages in the cattle herds of Queensland and confined areas of New South Wales.

This Cattle Tick is found embedded in the hide of the animal which it infests. By the parasite embedding itself in the hide it thus, more or less, penetrates the hide, and so destroys the greater portion of it. But it does not stop here, for the Tick harbours a micro-organism which gains entrance to the animal system through the integument surrounding the Tick, and entering the blood (vascular) system, produces the disease known as Red Water (Hæmoturea). Some parasites have to undergo various stages in different species of animals in order to arrive at a sexually mature age; whilst others undergo all the necessary stages, from the ovum to reproduction, in the one and the same animal.

As an example of those requiring various animals to complete their circle I think the one most familiar to all of us is the Hydatid

Tape Worm (*Tacuia Echinococcus,*), which, at one period of its life, inhabits the intestines of various domestic animals, notably the dog and sheep in this country. The segments of this worm are expelled from its host, and falling on the pastures, or being carried into creeks and dams, are eventually swallowed by sheep and cattle, and *very* often man himself. The result is Hydatid disease.

The eggs contained in these segments are hatched, and the young tape worm, or more accurately speaking, the embryo of such, is taken up by the blood stream, and carried all over the body, when, by a selective process peculiar to most worms, they escape into the lungs and liver mainly, and grow into a bladder-like form commonly known among slaughtermen as "water bags" or "bladders" (Echinococcus Veterinorum.) This stage of the tape worm is known as its cystic stage or hydatid stage. In man this cystic stage produces hydatid disease, only removable by operation. In sheep and cattle, etc., when they are slaughtered for human food, the lungs and liver constituting the "pluck," fall to our canine pets. The dog swallows these hydatids with his dish, and these bladder like bodies mature into the tape worm. Thus you can see how the rotation or cycle is kept going. If dogs and other carnivorous animals were prevented from devouring the viscera of sheep and cattle, and care taken to destroy the cysts after removal from the carcase much would be done towards the prevention of hydatid disease.

The majority of tape worms, however, undergo the whole process of maturity in the same animal by a process of budding, *i.e.*, each of the segments into which a tape worm is divided becomes in turn detached from the scolex or head, and is capable of developing into a mature worm.

I mentioned that parasites may be of vegetable or animal origin. For the present we will forget all about those of a vegetable nature, and divide the animal class into two great sections—

Entozoa—Those infesting the internal organs.

Epizoa—Those dwelling on the exterior of the host, which include fleas, lice, bugs, and various species of Sarcopti (Mange), etc.

The Entozoa, or those which infest the internal organs, are very simple in their organisation. They are invertibrate, and destitute of articulated limbs, contain an alimentary canal, and respiration is carried on very feebly. These Entozoa are subdivided into three great classes to one of which all parasites belong, viz :—

1. *Nematoda,* which includes all round worms. 2. *Cestoda,* which includes all tape worms (flat). 3. *Trematoda,* fluke shaped worms (flat).

My paper will consist of a few words relating to the most common parasites under these three heads found in our domestic animals, with perhaps mention of one or two existing in man, who, although termed lord of creation, is not too fond to act as the host to quite a number of parasites.

Nematoda or Round Worms. These as I have previously mentioned include all round worms, and thus make up a very large class. Most of them are of small size, (Filaria, etc.,) and are generally found in large numbers; are usually white, yellow, red, or marble in color. Male is smaller than the female, and sexes are usually separate and not hermaphrodite as with certain other parasites. The one most commonly met with in the horse belonging to this class is the

Ascaris Incalocephala, of which these are an example; are usually found in the intestines of the horse in great numbers, although their presence very seldom causes any inconvenience. As many as four or five hundred is quite a common occurence to be met with on making a *post morten*. It is said that fully 50 per cent. of our horses are infested with this parasite. They obtain their nourishment from the ingesta passing through the bowels. How the animal becomes infested with them is not positively known, as the full life history of these, as well as most Nematodes, has not been clearly demonstrated but it is the general opinion that they reach their destination, viz:—intestines through the medium of the animal's food. In shape they somewhat resemble a common earth worm as they taper toward the extremities.

The worm found in man corresponding in every respect to that found in the horse is called

Ascaris Lumbricoides which measures from six to fourteen inches in length.

Ascaris Mystox term given to one in cats.

Ascaris Marginata found in the dog.

Ciestodes or Tape Worms are distinguished mainly by their body resembling a tape or band. (Exception-Terchinococcus, of dog.) On examination we find the Tape Worm to consist of a number of segments. The anterior is designated the head which maintains its hold on to the wall of the alimentary canal by four suckers. Each of the segments in time separate from the scolex or head by a process of budding, and are called the generative segments for reproductive purposes. These segments are hermaphodite, and are ultimately expelled with the foeces, when they become destroyed, but the eggs with their hard shells retain vitality, and under favourable conditions arrive to a mature Tape Worm.

The horse as a rule harbours three Tape Worms. *Taenia Plicata Taenia Perfoliata. Taenia Mamillona.*

Taenia Perfoliata is found in the small intestines of the horse and generally in enormous numbers. About 25 per cent. of our Victorian horses are infested with this parasite.

Taenia Mamillona is also found in small intestines, it resembles in shape somewhat the form of a cow's teat. Hence its name. It is also pretty often met with in the horse, but not in large numbers.

Taenia Marginata found inhabiting intestines of the dog. Is found to be very common especially amongst our sheep dogs. (That is farm or country dogs). The segments of this worm after being voided from the dog are taken into the system by sheep, etc., grazing from pastures where dogs have voided their foeces. The result is that the eggs hatch into another cystic stage, which selects principally the fat surrounding the kidneys in the abdominal cavity known as the *Cysticercus tennicollis*. It is generally pulled out by the butcher, thrown into the nearest corner only to be devoured by the dog, which thus becomes infected with this tape worm.

Trematoda or Fluke variety. The principal parasite belonging to this group is that which is commonly known as Fluke, technically *Distome and Fasciola Hepaticum* (*Distome Lanceolatum* in cattle).

Fasciola Hepaticum is usually found inhabiting the bile ducts of sheep, sometimes cattle, and very rarely man. Measures about $\frac{3}{4}$ inch long, width $\frac{1}{2}$ inch. The body is flat, ends narraw. Anterior or head pointed with a neck, tail not so sharp, (truncated). Lateral margins uneven. Colour varies in proportion to amount of bile contained in digestive organs, brown when full, paler empty.

The Fluke contains very large digestive apparatus, and is well provided with organs of reproduction, being hermaphrodite. It has been estimated that one single Fluke will produce from 10 to 40,000 eggs.

The eggs of the Fluke do not undergo any change until they are expelled from the host, when falling on the moist ground the embryo escapes and moves about with great vigour by the help of cilia attached to the body, within a few days the embryo loses the power of locomotion due to the losing of the cilia; it then succeeds in entering into the body of some molluscous animal (snail) notably ***Planorbis*** and ***Bulinus*** or other snails found in the locality.

(1) The embryo in its new habitat is transformed into a kind of sac sporocyst or nurse known as (2) cercaria, which by a process of budding. reproduces a colony of redia or animalcules; these cercaria pierce their way through the wall of the sac or sporocyst, and by means of a tail (much resembling the formation of a tadpole) are once more enabled to move through the water again, but as yet they are not sexually mature, only being provided with digestive and excretory organs, so they again enter some other mollusc by means of a boring process. Dr. Cobbold believes this mollusc to be ***Lymnoeus minutus*** It loses its tail and rolls itself up in a coil and encysts itself by secreting an earthy material. This constitutes the pupa of the liver Fluke. This either escapes by the death of the mollusc into the water or on some marshy ground where it is taken up by the sheep and once gaining access into the alimentary canal finds its way to the bile ducts of and leading from the liver where it becomes sexually developed, and in the course of a few weeks perhaps has deposited thousands of eggs only to undergo the various changes which its former parent has only recently undergone.

Vestrus Equi or Bots. Although not coming under the class Entozoa, belong to the insect tribe; a sub-division of Arthropoda, a class of parasites.

Of all other parasites found affecting the horse's stomach the larvæ of the vestrus equi, a member of the vestrides or gad fly family, is the most common. It gains access to the stomach thus—

The fly alighting on long hair found under the chin, neck, and legs of the horse deposits her eggs, which, through the agency of a glutinous material, remain in contact with the hair. After three weeks the eggs are hatched and bring forth a small grub or maggot, which, falling into the animal's food or licked off by the animal itself, finds its way to the animal's stomach, where with the aid of two hooklets they attach themselves to the mucous membrane of the stomach. Their food consists of blood which they obtain from the vessels circulating through the walls of the stomach, here they remain for a period of about 8 months, when, detaching themselves from the stomach, are expelled by the host. They then find shelter in the loose earth, etc., in the fields only to undergo further development; after remaining in this situation for about 3 weeks it developes into a fly whose whole existence seems only to mature, deposit her eggs, and ultimately die. I might state that 80 per cent. of horses are infested with this parasite.

LECTURE ON ALGÆ.

By the Rev. W. J. Eddy.

Delivered before the Geelong Field Naturalists' Club.

I almost laugh at the idea of giving a lecture on Algæ! I can only hope, as an amateur, to give some information and offer some suggestions to any amateurs present. I cannot venture into such deep water in the study of Algæ as that into which Mr. Tisdall is competent to take us, and into which he did take us some months ago. "Little boats must keep near shore." On the occasion referred to, Mr. Tisdall told us that all Sea-weeds are made up of cells with a neucleus, each cell being composed of three ingredients, gelatine, water and mineral salts, the combination being a mass of protoplasm, *i.e.*, matter endowed with life. He told us also that these cells contained as colouring matter, chlorophyll. He detailed the method of re-production adopted by various classes of Sea-weeds; and he explained that the system of classification depended upon these three features,—1.—Cellular structure; 2.—Colour; and 3.—Method of re-production. He told us further that Algæ have no true roots, stems or leaves, and that they differ from all other plants in deriving their nourishment through all parts of their surface from the water in which they grow. My reason for recalling these thoughts is, that the way may thereby be made more plain for our simple study of Sea-weeds to-night. The study of Algæ is a section of Botany, but the Botanist generally confines his attention to the flowering and flowerless plants of the *land*, leaving to whosoever will, the study of the so-called "flowers of the sea." Not that all Algæ grow in the sea, many grow in fresh water, some also on moist rocks or soil, others upon diseased animal tissue, and one species at least, appears to be formed in the human stomach. In all over 2000 species are known and have been described. We are interested to-night in Marine Algæ—Sea-weeds, of which about 180 *genera*, and about 450 *species* have been found on the Victorian coast. The late Mr. J. B. Wilson classified 176 genera with 427 species in his valuable catalogue. As far as I can discover no genus has been named after him, but 9 species bear his name, an honour he richly deserved, when it is remembered that he discovered 66 new species of Algæ. Not that *he* named the 9 after himself, nor desired such an honour; but they were so named by the great Algologist, J. G. Agardh, to whom he was continually sending specimens through his friend, the late lamented Baron Von Mueller. I mention this in passing, as a suggestion to our young men that there is a more noble and worthy way of immortalising themselves when at the sea-side than in carving or scribbling their names on the shelters and rotundas, or even the rocks on which they pic-nic!

Let us suppose man to be an amphibious animal, and could continue his walk from the forest to the sea, and without any discomfort *through the sea along the bottom.* He would find the surface of the land above water to have its counterpart in hills, dales, mountains, valleys, chasms and plateaus under water. (The "Challenger" expedition proved that the depth of the sea in certain places corresponds virtually to the height of our highest mountains, *i.e.* about 5 miles.) He would further find himself making his way, now through a forest as dense as that through which Stanley marched in darkest Africa; now across sandy deserts like the African Sahara (only a little more wet); and now along stretches of plain as richly covered with verdure as an English park, a Scotch moor, or an Australian paddock. Instead of animals and birds, he would find himself surrounded by fish and the monsters of the deep. He would not discover anything to correspond to our trees as to size, for the stem of the largest Sea-weed is not greater than his thigh, and few of them are thicker than his finger: but as to length or height, he would have no cause to complain, for he would find all lengths, from the *Laminariæ* of 100 feet, to the *Macrocystis pyrifera* of 1,500 feet! In the 15th century, the mariners of Spain used to tell fabulous stories of having to cut their way through the gulf-weed of the Atlantic with hatchets; stories which the discoveries of Columbus put an end to; but there is no doubt that on his journey along the bottom, our amphibious man *would* need to cut his way with hatchets through the forests, as the traveller through the primitive Australian bush. I have suggested this sub-aqueous journey to convey to your minds the thought that the flora and fauna of the land have their counterpart in the Algæ of the sea; and though such a journey is impossible, we are able to discover much of the beauty of these Algæ by means of dredging, and also through the samples tossed up by wind and wave upon the shore. Many also may be gathered *in situ* from the rocks and pools as the tide recedes and at low water; care being taken, in these waters, that an octopus or a shark or a sting-ray does not get on too friendly terms with you. (I may mention that just a week ago whilst on the rocks at Barwon Heads, I caught a fair-sized octopus, which showed its ability to dart its tentacles a foot at least above the water's edge).

But not only on account of their variety and beauty should the study of Algæ claim our attention, but also on account of the multitudinous forms of animal life that infest them. With the Polyzoa, however, we have nothing more to do this evening than thus mention them.

But the vegetation of the sea should further claim our interest on account of its *utility.* Stored up in the cells of the *Laminaria*, is that valuable chemical, *Iodine*, extracted by fire in the kelp-kilns of Ireland and Scotland. I have watched the consumptive patient sitting on the sand at Barwon Heads—the shore being strewn with drying sea-weed, and stained with the Iodine which the sun has extracted therefrom, whilst the gentle breeze bears the healing fumes to his diseased and wasting lungs.

Sea-weeds also have their place in the manufacture of glass and of soap, of glue and varnish; their value as a manure cannot be overestimated; a large percentage of the Irish people being dependent on the harvest of sea-weed for manure for their potato fields.

Many of the Sea-weeds are edible; chief among these being the Carrageen and Irish Moss (*Chondrus Crispus*), largely employed in the preparation of jellies and blanc-mange; one of the "ladies' tresses" is esteemed in Scotland as an edible. Another of the same group, the *Laminaria saccharina* or sugar sea-beet is eaten in Ireland and Japan as a delicacy. The *Laminaria digitata* is cried about the streets of Edinburgh as "tangle;" others, such as the Dulses and the Lavers are also valuable. The most interesting, however, of the edible Algæ is the *Gelidium* or birds' nest weed of China and Japan. This weed is collected by swallows in the construction of their nests. In China the trade in these strange birds' nests forms a very lucrative and important item of commerce. Burnett, in his outlines of Botany observes—"It has been estimated that 242,400 lbs. of birds' nests, worth in China £234,290 and upwards are annually exported from the Indian Archipelago."

I mention these items *re* Sea-weeds in order to show you they are deserving of more attention than they usually receive; indeed it is probable that the discoveries of the epicure and the chemist as to their edible and mercantile value have spurred the botanist to give them more careful study, and opened the eyes of the ordinary holiday maker, so that he no longer regards them with contempt as lowest in the scale of creation and unworthy of any notice.

Well says M. Tupper:—

"The sea-wort floating on the waves, or rolled up high along the shore,
Ye counted useless and vile, heaping on it names of contempt,
Yet hath it gloriously triumphed, and man been humbled in his ignorance;
For health is in the freshness of its savour, and it cumbereth the beach with wealth,
Comforting the tossings of pain with its violet tinctured essence:
And by its humbler ashes enriching many proud.
Be this, then, a lesson to thy soul, that thou reckon nothing worthless
Because thou heedest not its use, nor knowest the virtues thereof.
And herein, as thou walkest by the sea, shall weeds be a type and an earnest
Of the stored and uncounted riches lying hid in all the creatures of God."

Probably the study of Algæ is to a few a passion, partly because they are found out of the beaten track of daily life. Living here at Geelong, within a few miles of the richest hunting-grounds in Victoria for these treasures of the deep, we need not go much out of our way to secure them. And just because so few tackle the subject with anything like patience and systematic study, is there the greater encouragement for intelligent youths to make Algæ their hobby, and be so devoted to their study as to make a name for themselves. Nansen's fame as an explorer has followed from his acting upon this famous saying :—"Man wants to know, and when he ceases to want to know, he ceases to be man."

But even if the study does not lead to fame, it forms a pleasing recreation, and withal profitable, for " the day is not wholly profane in which we have given heed to some natural object."

The best specimens are obtained in summer and autumn, for then they are in fruit, just as the botanist on the land finds his best specimens of mosses and lichens in winter.

A few hints, gathered from experience, concerning collecting and preserving specimens may be useful. Many specimens may be picked up on the shore as the tide recedes, but as they rapidly deteriorate, it is probable that only those that are covered either by weed or by sand will be of any service to you. You will often secure choice specimens by wading amongst drifting weed along the shore and snatching up those pieces that commend themselves. Other pieces are obtained *in situ* as the tide recedes, and in sheltered pools ; others again by dredging in the pools or the deep sea. Having secured your specimens, (and a small bit of each will be sufficient), store them away from the light at once in your basket, or other vessel, and if possible in bottles of salt water, till you get home. They should be assorted and mounted at once. Wash out all sand, &c., in salt water and use fresh water during the process of floating and mounting them. I have invariably floated the specimens on to the paper on which I intend to permanently keep them (the plan of drying them between blotting paper first and then mounting them on paper is a tedious and less satisfactory one), and I have found that in three cases out of four the adhesive matter which the Algæ contain will cause them to stick well to the paper.

Use paper about 8 x 10 (drawing paper will do), only let it be fairly stiff and smooth, and not liable to wrinkle after immersion in the water. For floating your specimen use a wash-hand basin (a rectangular vessel is of course better), and having disentangled it and spread it out to your satisfaction, introduce your paper into the water beneath it ; lift in gently and hold it near the surface whilst you complete the arrangement of it. For this, a tooth-brush, camel-hair brush, hair-pin, &c., may be used according to the character of the weed. By raising it out of the water, you will find that it will fall gracefully into position on the paper, and by dipping into the water again, first one corner and then another, you will frequently be able to arrange it to your satisfaction, though it may be necessary to yet further spread out your specimen. Now place it to drain—damp off excessive moisture carefully with blotting-paper, and then place between sheets of blotting-paper putting pieces of muslin over the more delicate specimens, and then place in the press. You will have no difficulty in making a temporary press, only be careful that the boards used are smooth and level and that the pressure is evenly distributed. Examine the specimens in 24 hours, or perhaps less, change the blotting paper, drying what is wet in the sun to avoid mildew ; change again a few times and increase the pressure according to the nature of the weed, then remove, attach date of collection and locality, and name, and classify when convenient.

At first you will probably get someone who knows to name and classify your specimens for you, and then you may venture to do this for yourself by comparing your specimens carefully with those in a private or public collection. But presently you will be ambitious to know *why* certain plants are given certain names; in other words, according to what plan or system Algæ are named and classified. I have already mentioned that on the Victorian coast there are about 450 varieties included in 180 genera. The classification of these is decided on three grounds. 1.—Their cellular structure ; 2.—Colour ; 3.—Method of reproduction.

All Algæ are divided into three great classes :—The Olive-colored or *Melanospermeæ* ; the Red or Rose-colored or *Rhodospermeæ* ; the Green-colored or *Chlorospermeæ*. And here let me say, as in botany generally, these names, as also of the orders and genera and species are derived from the Greek. This is the rule to which there are exceptions.

Cuvier used words like the following concerning the fossil remains of animals : " Shew me a tooth, and I will indicate the general conformation ; or describe the conformation and if the teeth be missing, I will at once pronounce what they should be like." So an experienced Algologist will tell the color of a sea-weed from its fructification, and similarly, will describe the fructification from its color. There is a direct relation between the color of a sea-weed and its mode of reproduction. As with the land—the earth brings forth grass and herb yielding seed after his kind, and the tree yielding fruit whose seed is in itself, after his kind—so with the sea.

The *Melanospermeæ*, Olive-colored, are of strong growth chiefly, and of leathery consistency, and most of them grow near the shore. There are 7 orders, 39 genera under this class, *i.e.* in Victoria, as already classified.

The *Rhodospermeæ* or Red Sea-weeds, are more fragile and grow in deep water or sheltered pools protected from waves and shaded from sunlight. There are 21 orders, 122 genera under this class.

The *Chlorospermeæ* are found in deep water and also on rocks laid bare by the receding tide; are more hardy and suffer nothing by this constant exposure to wind and sunshine. Under this class there are 4 orders, 16 genera.

These last are the simplest and therefore the lowest forms of Algæ, as also by far the smallest in variety.

The first mentioned are the most complex and therefore the highest forms.

The lowest forms are reproduced by *spores*, like the seeds of plants. The highest forms by *zoospores*, like buds. But all may be regarded as made up of cells that separate spontaneously, and in course of time become independent plants.

Diatoms were once supposed to belong to the animal kingdom, but are now classfied with the Algæ, under the order *Diatomaceæ*. These Diatoms are composed of *one cell*, each *having two valves*.

Most of the Algæ are composed of a cell mass. Others of a cell-plate, such as the *ulva*. Others of a cell *filament* such as *Cladophora*.

To describe why the various genera and species of Algæ are so named is beyond me; I will, however, offer a few suggestions thereon. I have mentioned that the names of the classes, orders, genera and species are chiefly of Greek derivation. Beginning with the lowest forms, the Chlorospermeæ, we have the order *Ulva* from Ul, Celtic word for water. In this order we have the genus *Lactuca* (Latin for lettuce).

Another order is named *Confervaceæ* (frond's filamentous) with a genus *Cladophora* (branch-bearing) and a species *Feredayi* (named after a Tasmanian clergyman). Belonging to the same order is the genus *Enteromorpha* (intestine-like). Another order is named *Siphonaceæ*, (the Algæ being tubular), with its rare genus *Bryopsis*, (from Bruon, moss), and its choice species, *Plumosa*, fairly common at Geelong.

Passing to the *Rhodospermeæ*, we have the order *Ceramieæ* (from their waxen appearance), with the genera *Callithamnion*, (beautiful little shrub), *Ptilota* (feather-weed), *Spyridea* (basket-weed), *Rhodophyllis* (rose-leaved), *Schizymenia* (cloven membrane), *Kalymenia* (beautiful membrane), *Rhodymenia* (red membrane), and *Dasya* (hairy).

Some genera and a large number of species are named in honour of individuals, *e.g.* genus *Griffithsia*, after Mrs. Griffiths, Torquay; *Ballia*, after Miss Ball; *Laurencia*, after M. de la Lauriencia, a French naturalist; *Delesseria*, in honor of Mons. Delessert, a French botanist and naturalist.

Many are named after Harvey, Agardh, Mueller, and Wilson, all prominent botanists and algologists.

The lecturer then shewed several specimens to illustrate the system of naming and classifying, pointing out the appropriateness of the names given, notably *Hypnea Episcopalis*, from *hypnum* moss, and *Episcopalis*, with reference to the resemblance of the developing frond to a Bishop's staff; and *Dictyurus Quercifolius*, from *diktuon*, a fishing net, *quercus*, an oak, and *folium* a leaf. He then made some impromptu remarks in the course of which he recommended to beginners Mr. Hibberd's "Sea-weed Collector," and "Common Sea-weeds," by Mrs. Lane Clark, and concluded with the quotation :—

> **"Not lost the time in sea-side ramble spent;**
> **Braced is the frame, and mental health is gained :**
> **Knowledge obtained of Him who made the deep,**
> **And blissful love acquired of Nature's works."**

BIRDS

OF

GEELONG AND CAPE OTWAY DISTRICT.

COLLECTED BY J. F. MULDER.

THE following letters indicate locality where specimens were obtained:—
R. Ranges. O.C. on Coast. L.W.C. Lightly Wooded Country. C.B. Corio Bay.
S. Swamps. L.C. Lake Connewarre. G. General. R. & P. Ranges and Plains.
C.O. Cape Otway, B.C. Bream Creek. S.C. Spring Creek. P. Plains.

1	Aquila audax	Lath.	Wedge-tail Eagle (Eaglehawk). G
2	Haliætus leucogaster	Gmel.	White-bellied Sea-Eagle. OC
3	Haliastur sphenurus	Vieill.	Whistling Eagle. R
4	Falco melanogenys	Gld	Black-checked Falcon. LWC
5	„ lunulatus	Lath.	White-fronted Falcon. LWC
6	Hieracidea berigora	Vig. & Hors.	Brown Hawk. G
7	Tinnuncnlus cenchroides	Vig. & Hors.	Nankeen kesterel. LWC
8	Astur cinereus	Vieill.	New Holland Goshawk. R
9	„ novæ-hollandiæ	Gmel.	White Goshawk. R
10	„ approximans	Vig. & Hors.	Australian Goshawk. R
11	Accipiter cirrhocephalus	Vieill.	Collared Sparrowhawk
12	Elanus axillaris	Lath.	Black-shouldered Kite. LWC Visits
13	Circus gouldii	Bon.	Allied Harrier. S
14	„ assimilis	Jard. & Selb.	Jardine's Harrier. S
15			Harrier unnamed
16	Strix nov. holl.	Steph.	Masked Owl. R
17	„ castanops	Gld	Chestnut-faced Owl. R
18	„ candida	Tickell	Grass Owl. LWC
19	„ flammea (sub sp. delicatula)	Linn.	Delicate Owl. LWC
20	Ninox strenua	Gld	Powerful Owl. R
21	„ connivens	Lath.	Winking Owl. LWC
22	„ boobook	Lath.	Boobook Owl. G
23	„ maculata	Vig. & Hors.	Spotted Owl. LWC
24	„ Ægotheles nov. holl.	Vig. & Hors.	Owlet Nightjar. Jan Juc
25	Podargus strigoides	Lath.	Tawny-shouldered Podargus. LWC
26	„ cuvieri	Vig. & Hors.	Cuvier's Podagus. R
27	Eurostopodus albogularis	Vig. & Hors.	White-throated Nightjar. Batesford
28	Chætura caudacuta	Lath.	Spine-tailed Swift. R & P
29	Cypselus pacificus	Lath.	Australian Swift. LC
30	Hirundo neoxena	Gld	Welcome Swallow. General
31	Hylochelidon nigricans	Vieill.	Tree Swallow. CO
32	Merops ornatus	Lath.	Australian Bee-eater. North Shore
33	Dacelo gigas	Bodd.	Great brown Kingfisher (Laughing Jackass). G
34	Halcyon sanctus	Vig. & Hors.	Sacred Kingfisher. R
35	Alcyone azurea	Lath.	Azure Kingfisher. BC & R
36	Artamus sordidus	Lath.	Wood Swallow. General
37	„ personatus	Gld	Masked Wood Swallow. BC

38	Artamus superciliosus	Gld	White-eyebrowed Wood Swallow. BC
39	Pardalotus punctatus	Temm.	Spotted Pardalote (Diamond Bird). R
40	,, ornatus	Temm.	Striated ,, ,, R
41	Strepera graculina	White	Pied Crow-Shrike. R
42	,, cuneicaudacuta	Vieill.	Grey ,, ,, Jan Juc
43	,, leuconota	Gld	White-backed ,, G (Magpie)
44	,, torquatus	Lath.	Collared, ,, G
45	Grallina picata	Lath.	Pied Grallina (Mudlark). G
46	Graucalus melanops	Lath.	Black-faced Graucalus. G
47	Pachycephala gutturalis	Lath.	White-throated Thickhead. R
48	,, rufiventris	Lath.	Rufous-breasted ,, LWC
49	,, olivacea	Vig. & Hors.	Olivaceous ,, R
50	Collyriocincla harmonica	Lath.	Harmonious Shrike-Thrush. R
51	Falcunculus frontatus	Lath.	Frontal Shrike-Tit (Crested Shrike). R
52	Rhipidura albiscapa	Gld	White-shafted Fantail. G
53	,, rufifrons		Rufous-fronted Fantail. R
54	Sauloprocta motacilioides	Vig. & Hors.	Black Fantail (Williewagtail). G
55	Seisura inquieta	Lath.	Restless Flycatcher. G
56	Myiagra rubecula	Lath.	Leaden-colored Flycatcher. LWC
57	,, nitida	Gld	Shining ,, R
58	Micræca fascinans	Lath.	Brown ,, LWC
59	Smicrornis brevirostris	Gld	Short-billed Smicrornis. G
60	Erythrodryas rhodinogaster	Drap.	Pink-breasted Wood Robbin. R
61	,, rosea	Gld	Rose-breasted ,, ,, R
62	Petrœca leggii	Sharpe	Scarlet-breasted Robin. G
63	,, phœnicia	Gld	Flame-breasted ,, G
64	Melanodryas bicolor	Vig. & Hors.	Hooded or Pied ,, (Black Robin) LWC
65	Eopsaltria australis	Lath.	Yellow-breasted ,, (Yellow Robbin). R
66	Malurus cyaneus	Lath.	Supurb Warbler (Blue Wren) G
67	Stipiturus malachurus	Lath.	Emu Wren. OC
68	Sphenura broadbenti	McCoy	Rufous-headed Bristle Bird. R
69	Cisticola ruficeps	Gld	Roufous-headed Grass Warbler. LC
70	Sericornis frontalis	Vig. & Hors,	White-fronted Sericornis. R, H. Hill
71	Acanthiza lineata	Gld	Striated ? Acanthiza. LC
72	Geobasileus chryssorhœa	Quoy. & Gaim.	Yellow-rumped Geobasileus. G
73	,, reguloides	Vig. & Hors.	Buff-rumped ,, R
74	Ephthianura albifrons	Jard. & Selb.	White-fronted Ephthianura. G
75	Calamanthus fuliginosus	Vig. & Hors.	Striated Calamanthus. BC
76	,, campestris		Field ,, SC
77	Anthus australis	Vig. & Hors.	Australian Pipit (Groundlark) G
78	Calamoherpe australis	Gld	Reed Warbler. G
79	Estrilda (Zonæginthus) bella	Lath.	Fire-tailed Finch. R
80	,, (Ægintha) temporalis	Lath.	Red-eyebrowd Finch (Waxbill) G
81	,, (Stagonopleura) guttata	Shaw	Spotted-sided ,, (Diamond Sparrow). LWC
82	Cinclosoma punctatum	Lath.	Spotted Ground Thrush. R
83	,, cinnamomeum	Gld	Cinnamon-colored ,, R
84	Geocichla lunulata	Lath.	Mountain Thrush. R
85	Ptilonorhynchus violaceus	Vieill.	Satin Bower-Bird. R
86	Corcorax melanorhamphus	Vieill.	White-winged Chough. Jan Juc
87	Corone australis	Gld	Australian Raven. G
88	Corvus coronoides	Vig. & Hors.	White-eyed Crow. G
89	Pomatostomus temporalis	Vig. & Hors.	Temporal Pomatostomus. LC
90	Meliornis nov. holl.	Lath.	New Holland Honey-Eater. G
91	,, sericea	Gld	White-cheeked. R
92	,, (Lichmera) australasiana	Shaw	Tas. Honey-Eater (HorseshoeH.E.). G
93	Glyciphila fulvifrons	Lewin	Fulvous-fronted Honey-Eater. LWC (Spring Creek, Belcher)

94	Ptilotis lewinii	Swain.	Lewin's Honey-Eater.	G
95	„ vittata	Cuv.	Singing „	BC
96	„ leucotis	Lath.	White-eared „	G
97	„ (Lichenostomus cratitia	Gld	Wattle-cheeked „	G
98	„ ornata	Gld	Graceful „	R
99	„ penicillata	Gld	White-plumed „	G
100	„ chrysops	Lath.	Yellow-faced „	SP
101	Meliphaga phrygia	Lath.	Warty-faced „	LWC
102	Acanthogenys rufogularis	Gld	Spiny-cheeked „	LWC
103	Anthochæra carunculatus	Lath.	Wattled H.E. (Wattle Bird).	LWC
104	Anellobia mellivora	Lath.	Brush Wattle Bird.	Jan Juc
105	Acanthorhynchus tenuirostris	Lath.	Spinebilled Honey-Eater.	R
106	Melithreptus lunulatus	Shaw	Lunulated „	R
107	Myzantha garrula	Lath.	Garrulous „ (Miner).	G
108	Dicæum hirundinaceum	Shaw	Swallow Dicæum.	LWC
109	Zosterops caerulescens	Lath.	Grey-backed Zosterops (Silvereye).	G
110	Climacteris scandens	Temm.	Brown Tree-Creeper.	LWC
111	Cuculus pallidus	Lath.	Pallid (Unadorned) Cuckoo.	G
112	„ flabelliformis	Lath.	Fantailed Cuckoo.	G
113	Chalcites plagosus	Lath.	Bronze „	G
114	„ basalis	Hors.	Narrow-billed Bronze Cuckoo.	G
115	Plictolophus (Cacatua) galerita	Lath,	Great Sulphur-crssted Cockatoo.	G
116	Licmetis nasica	Temm.	Long-billed Cockatoo (Corella).	R
117	„ funereus	Shaw	Funeral „	R
118	Callocephalon galeatum	Lath.	Gang-Gang „	R
119	Aprosmictus scapulatus	Bechs.	King Lory.	R
120	Platycerus pennantii	Lath.	Pennant's Parrakeet (Red Lory).	G
121	„ eximius	Shaw	Rose Hill „ (Rosella).	G
122	Psephotus hæmatonotus	Gld	Red-rumped „	LWC
123	Euphema elegans	Swain.	Elegant Grass „	G
124	„ chrysogastra	Lath.	Orange-bellied Grass Parakeet.	G
125	Pezophorus formosus	Lath.	Ground or Swamp-Parakeet.	S & LWC Connewarre Lakes & Wensleydale
126	Lathamus discolor	Shaw	Swift Lorikeet.	G
127	Trichoglossus nov. holl.	Gmel	Blue Mountain (Swainson's) Lorikeet.	G
128	„ (Glossopsitta) concinnus	Shaw	Musk Lorikeet.	G
129	„ „ porphyrocephhlus	Dietr.	Porphyry-crowned Lorikeet.	G
130	„ „ pusillus	Shaw	Little „	G
131	Phaps chalcoptera	Lath.	Bronze-wing Pigeon.	LWC
132	„ elegans	Temm.	Brush Bronze-wing Pigeon.	R
133	Geopela tranquillia	Gld	Peaceful Dove.	R
134	Turnix varius	Lath.	Painted Quail.	R
135	„ velox	Gld	Swift-flying Turnix.	LWC
136	„ pyrrhothorax	Gld	Chestnut-breasted Turnix.	LWC
137	Pedionomus torquatus	Gld	Collared Plain Wanderer.	LWC
138	Coturnix pectoralis	Gld	Pectoral Quail (Stubble Quail).	G
139	Synoicus australis	Lath.	Swamp or Partridge Quail.	LWC
140	Excalfatoria australis	Gld	Least or King „	Highton
141	Eupodotis australis	Gray	Bustard (Wild Turkey.)	P
142	Œdicnemus grallarius	Lath.	Southern Stone Plover.	G
143	Hæmatopus longirostris	Vieill.	White-breasted Oyster-Catcher.	OC
144	Lobivanellus lobatus	Lath	Wattled or Spurwing Plover.	G
145	Sarciophorus pectoralis	Cuv.	Black-breasted „	G
146	Charadrius (Squatarola) helvetica	Linn.	Grey „	Queenscliff
147	„ fulvus	Gmel.	Australian Golden „	OC
148	Ægialitis monacha	Geoff.	Hooded Dottrel.	OC
149	„ nigrifrons	Cuv.	Black-fronted „	P
150	„ ruficapilla	Temm.	Red-capped „	OC

151	Ægialitis bicincta	Jard. & Selb.	Double-banded Dottrel. P
152	Erythogenys cinctus	Gld	Red-kneed ,, OC
153	Himantopus leucocephalus	Gld	White-headed Stilt. LC
154	,, pectoralis	Dubus	Banded ,, LC
155	,, rubricollis	Temm.	Red-necked Avocet. LC
156	Limosa uropygialis	Gld	Barred-rumped Godwit. OC
157	Tringa (Limnocinclus) acuminata	Hors.	Marsh Tringa. LC
158	,, (Schœniclus) subarquata	Gmel.	Curlew Sandpiper. LC
159	,, albescens (ruficollis)	Temm.	Little ,, OC
160	,, canutus	Linn.	Knot. OC
161	Glottis glottoides	Linn.	Greenshank. LC
162	Gallinago australis	Lath.	New Holland Snipe. G
163	Rhynchæa australis	Gld	Painted ,, LC
164	Numenius cyanopus	Vieill.	Australian Curlew. OC
165	,, uropygialis	Gld	Whimbrel. P
166	Geronticus spinicollis	Jameson	Straw-necked Ibis. P
167	Threskiornis strictipennis	Gld	White ,, LC
168	Platalea flavipes	Gld	Yellow-legged Spoonbill. G
169	Grus australasianus	Gld	Australian Crane (Native Companion). P
170	Ardea pacifica	Lake	Pacific Heron. LC
171	,, nov. holl.	Lath.	White-fronted Heron (Blue Crane). G
172	Herodias alba	Linn	White Egret. LC
173	,, intermeda	Hass.	Plumed ,, LC
174	Nycticorax caledonicus	Lath.	Nankeen Night Heron (Nankeen Crane). G
175	Botaurus poicilopterus	Wagl.	Australian Bittern. LC
176	Ardetta minuta	Linn.	Minute ,, (Little Bittern). LC
177	Porphyrio melanotus	Temm.	Black-backed Porphyrio (Waterhen). LC
178	Tribonyx ventralis	Gld	Black-tailed Tribonyx (Moorhen) LC
179	Gallinula tenebrosa	Gld	Sombre Gallinule. LC
180	Fulica australis	Gld	Australian Coot. LC
181	Hypotænidia philippensis	Linn.	Pectoral Rail (Landrail) G
182	,, (Lewinia) brachipus	Swain	Lewin's Rail. LC
183	Porzana fluminea	Gld	Spotted Water Crake. LC
184	,, palustris	Gld	Little ,, ,, LC
185	,, tabuensis	Gmel.	Tabuen ,, ,, LC
186	Cygnus atratus	Lath.	Black Swan. LC
187	Cereopsis nov. holl.	Lath.	Cape Barren Goose. LC
188	Anseranas melanoleuca	Lath.	Semipalmated or Magpie Goose. LC
189	Branta (Chlamydochen) jubata	Lath.	Maned Goose (Wood Duck). G
190	Casarca tadornoides	Jard.	Chestnut-colored Shieldrake (Mountain Duck). G
191	Anas superciliosa	Gmel.	Australian Wild Duck (Black Duck) G
192	,, castanea (punctata)	Eyton	Australian Teal. LC
193	,, gibberifrons	Mull.	Grey Teal. G
194	Stictonetta nævosa	Gld	Freckled Duck. LC
195	Spatula rhyncotis	Lath.	Australian Shoveller. LC
196	Malacorhynchus membranaceus	Lath.	Pink-eyed Duck. LC
197	Dendrocygna (Leptotarsus) Eytoni	Gld	Eyton's Tree-Duck. Visits District
198	,, vagans	Eyton	Whistling ,, ,, ,,
199	Nyroca australis	Gld	White-eyed Duck (Hardhead). G
200	Erismatura australis	Gld	Blue-billed ,, LC
201	Biziura lobata	Shaw	Musk ,, LC
202	Larus pacificus	Lath.	Pacific Gull. OC
203	,, (Xema) nov. holl.	Steph.	Jameson's Silver Gull. OC
204	Sterna caspia	Pall.	Caspian Tern
205	,, bergii	Lecht.	Bass Straits Tern

206	Sterna anglica	Mont.	Long-leggd Tern	CB	
207	Sternula nereis	Gld	Little ,,	CB	
208	Hydrochelidon hybrida	Pall.	Marsh ,,	LC	Visits
209	Sterna fuliginosa	Gmel.	Sooty ,,	CB	Visits
210	Diomedia (Phœbetria) fuliginosa	Gmel.	Sooty ,,	CB	Visits
211	Fulmarus glacialoides	Smith	Silvery-grey Petrel.	OC	
212	Puffinus (Nectris) brevicaudus	Brandt.	Sooty ,, (Mutton-Bird)	CB	
213	Daption capensis	Linn.	Cape Petrel (Cape Pigeon)	Bellarine	
214	Procellaria nereis	Gld	Grey-backed Storm-Petrel	Hobson's B	
215	Pelecanus conspicillatus	Temm.	Australian Pelican.	LC	
216	Graculus nov. holl.	Steph.	Australian Cormorant.	CB	
217	,, leucogaster	Gld	White-breasted ,,	CB	
218	,, melanoleucus	Vieill.	Little ,,	CB	
219	,, stictocephalus	Bon.	Little Black ,,	CB	
220	Plotus nov. holl.	Gld	New Holland Darter.	LC	
221	Sula serrator	Banks	Australian Gannet.	CB	
222	Podiceps cristatus	Linn.	Australian Tippet Grebe.	CB	
223	,, nestor	Gld	Hoary-headed Grebe (Dabchick)	CB	
224	,, nov. holl.		Black-throated Grebe	LC	
225	Eudyptula undina	Gld	Fairy Penguin	CB	

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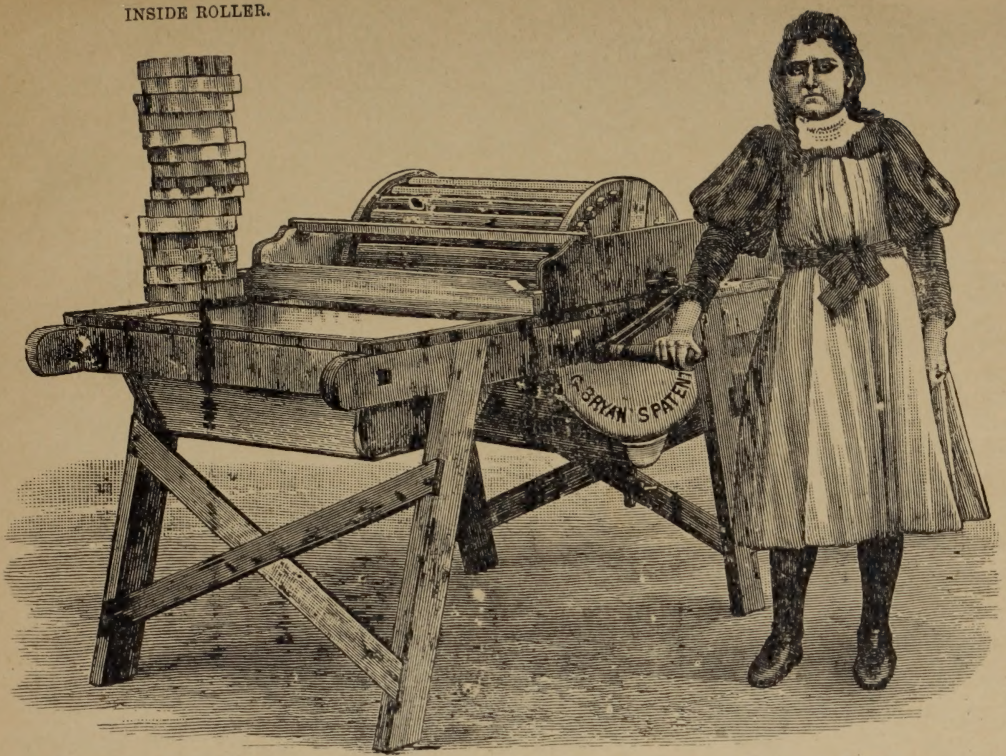

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